

# X2Go: An Alternative to X11 and VNC

Note: X2Go is an application that enables you to do remote visualization on Pleiades. Benchmarks performed by NAS staff show that X2Go provides much better performance than X11 forwarding. Although it is not as fast as VNC, X2Go has the benefit of letting Pleiades seem like your local system without the need for an additional window manager as in the case of VNC.

X2Go Client requires a local X11 server to display the remote sessions. The server you use depends on your local operating system, as follows:

- Windows systems: an X11 server is provided with X2Go client.
- Linux systems: the client component of X2Go uses the local Xorg server.
- Mac OS X systems: you must install the XQuartz X11 server as an extra component.

The information provided in this article is mostly for use on Mac systems. Additional information for use on Windows and Linux will be added when we learn more about using X2Go on those systems.

## Before You Begin

You must have [SSH Passthrough](#) set up for connection from your local desktop to Pleiades.

If XQuartz is not installed on your Mac, download it from this [XQuartz site](#) and install it. (Administrator privilege may be required for the installation.)

## Enable the X2Go Server on Pleiades

The X2Go server (with some security modifications) is available as a software module on Pleiades:

```
pfe% module avail x2go
x2go/stable
```

In order to use X2Go, add the following to your `.bash_profile` on Pleiades (regardless of which shell you use):

```
source /usr/local/lib/global.profile
module load x2go/stable
```

## Download the X2Go Client

You can download X2Go from the [Getting X2Go web page](#).

- For Mac and Windows systems, choose the version closest to your current operating system's version number.
- For Linux systems, read the information in the **X2Go Package Repositories for GNU/Linux** section of the web page.

Note: The steps in this article are based on the `x2goClient_latest_macosx_10_13.dmg` version for Mac systems.

## Install the X2Go Client

A normal installation into the `/Applications` folder on a Mac system may require administrator privilege. If you do not have the administrator privilege, follow these steps:

1. On your Mac's desktop, create a subdirectory (for example, `~/Desktop/dir.x2go`) and move the `X2GoClient_latest_macosx_10_13.dmg` file into that subdirectory.
2. Modify the extended attributes of that subdirectory with the `-cr` option of the `xattr` command, where `-c` clears all attributes and `-r` means recursive.

```
your_local_system% xattr -cr ~/Desktop/dir.x2go
```

3. Double-click the `.dmg` file in the `dir.x2go` directory to mount it. An **x2goclient** volume icon and a window containing an **x2goclient.app** icon will appear on your



desktop:

4. Drag the **x2goclient.app** icon from the window to your desktop, and eject the **x2goclient** volume. The **x2goclient.app** icon will now appear on your desktop.

## Steps for Using X2Go for Remote Visualization

You can use either a Pleiades front end (PFE) or a compute node to do remote visualization using X2Go.

Note: Performance decreases substantially for both X2Go and VNC on a heavily loaded PFE. For best performance, do remote visualization on a compute node if you plan to run a graphically intense application.

### Step 1: Create an SSH Tunnel

#### If You Are Using a PFE

If you want to use a PFE for X2Go, for example, `pfe20`, SSH into the PFE as follows:

```
your_local_system% ssh -L 8222:localhost:22 pfe20
```

where 8222 is the local port on your local desktop and 22 is the remote port on the PFE. The remote port number *must* be 22. You can choose a different local port numberâ however, there are some restrictions on which ports can be used. In our testing, port numbers between 8000 and 9000 work properly as the local port for X2Go.

If you plan to establish two connections and switch between them from time to time, use different local port numbers for the two connectionsâ for example, one connection uses 8222 and the other uses 8333.

TIP: To keep your X2Go sessions easier to manage and troubleshoot, we recommend that you select and keep the same PFE as your X2Go remote server, unless that PFE is very busy or unavailable.

Once you establish the SSH connection, continue with **Step 2: Start the X2Go Client Application**.

## If You Are Using a Compute Node

If you want to use a compute node for X2Go, complete these steps.

- a. Log into a PFE and submit a PBS job in order to access a compute node:

```
pfe% qsub -I -q devel -lselect=1:ncpus=28:model=bro
PBS r601i0n7>
```

Alternatively, you can reserve a dedicated compute node and SSH into your reserved node (for example, r601i0n7):

```
pfe% pbs_rfe --duration 10+ --model bro
pfe% ssh r601i0n7
```

- b. Create an SSH tunnel from your local system to the compute node:

```
your_local_system% ssh -o "StrictHostKeyChecking=ask" -L \
8222:localhost:22 -o ProxyJump=sfe,pfe20 r601i0n7
```

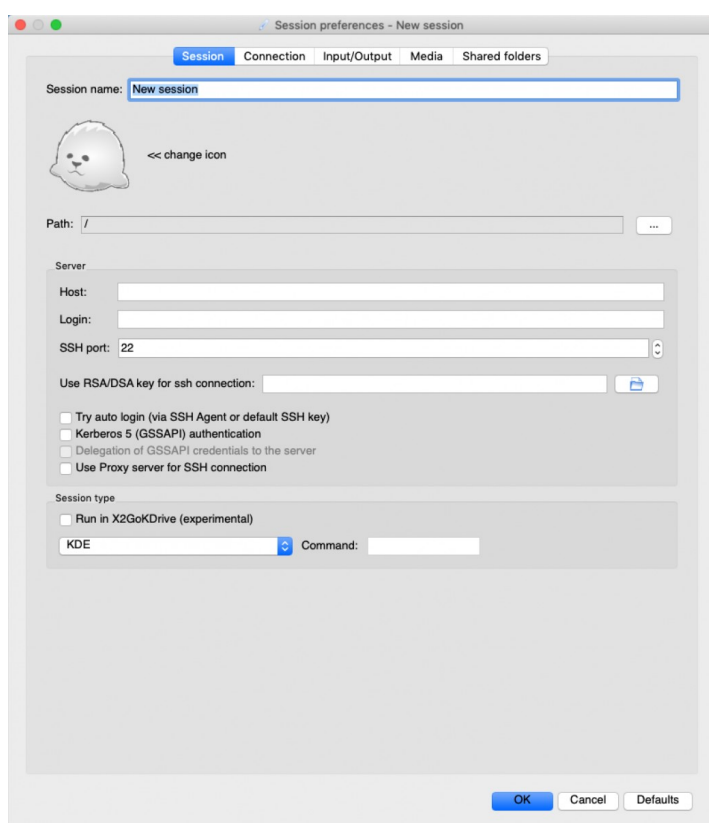
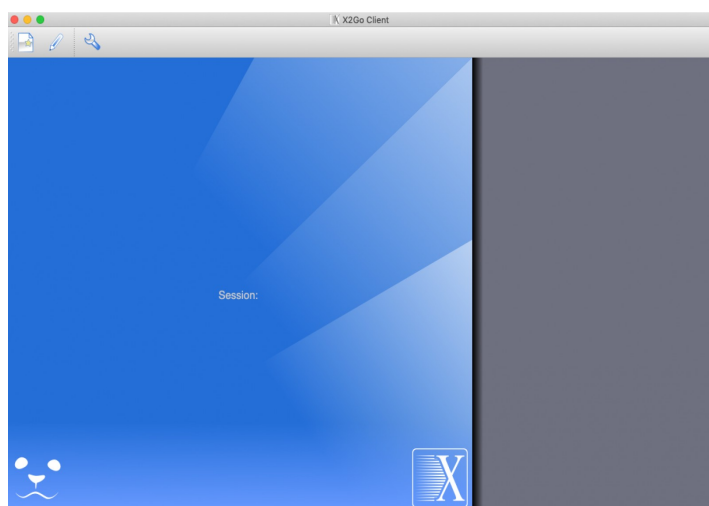
Note: This command line is too long to be formatted as one line, so it is broken with a backslash (\).

Once you establish the SSH connection, continue with **Step 2**.

## Step 2: Start the X2Go Client Application

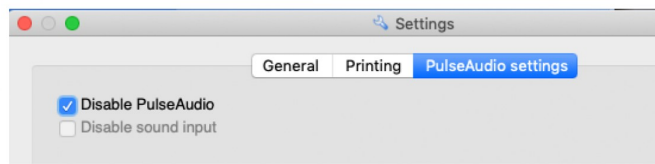
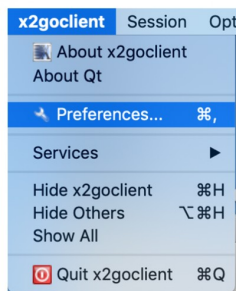
Double-click the **x2goclient.app** icon on your desktop. A directory called `~/x2go` will be created on your local system the first time you do this.

As shown below, two windows will appear: an **X2Go Client** window, and a window in gray called **Session preferences - New Session**, where you can configure settings. This window opens on the **Session** tab and shows default settings.



#### Notes:

- If you don't see the **Session preferences - New Session** window, find the **x2goclient** toolbar at the upper left of your desktop and select **New session** from the **Session** pulldown menu.
- You might see a pop-up dialog window that asks you to deny or allow PulseAudio to accept incoming network connections. Unless you need audio from the remote server, we suggest you deny it. To prevent the message from appearing during future connections, disable PulseAudio in the **PulseAudio settings** pane of the **Preferences** panel, as shown below:



### Step 3: Configure Your Session

In the **Session preferences - New session** window, configure your session as follows:


- a. In the **Session name** field, enter a name of your choice.  
In these steps, we use the names **PFE\_XTERM** (for a single xterm session, without a desktop), and **PFE\_ICEWM** (for an IceWM window manager session, with a desktop as in the case of VNC). The way to specify the **Session type** is described in substep 5, below.

Note: Our benchmark results show that the performance of a single xterm session is better than an IceWM window manager session.

- b. In the **Host** field, enter: **127.0.0.1**  
This local host address cannot be changed.
- c. In the **SSH port** field, enter a local port number; for example, 8222 or 8333.  
We use the port number 8222 in the **PFE\_XTERM** example, and 8333 in the **PFE\_ICEWM** example. You can choose a different port number, as long as it is consistent with what you used in **Step 1: Create an SSH Tunnel**.
- d. Activate **Try auto login (via SSH Agent or default SSH key)** by checking the box.
- e. Under **Session type**, do one of the following:
  - ♦ To run a single xterm application without a desktop: In place of **KDE** (the default setting), select **Single application** from the pulldown menu and enter **/usr/bin/xterm** in the **Command** field.
  - ♦ To confine your Pleiades graphics activity into a single window on your local system: In place of **KDE**, select **ICEWM** from the pulldown menu.  
Note: **PFE\_ICEWM** is the only selection that currently works.
- f. **Optional:** You can also configure the image quality on the **Connection** tab, and the width and height on the **Input/Output** tab. Nothing else needs to be modified.
- g. Click **OK**.

Note: A session configuration is kept even after a reboot of your local system. This makes it simpler to reuse the same session configuration for a newly established SSH tunneling connection in a future session.

If you want to permanently remove a session configuration, use one of these two methods:

- Click on the  icon located at the lower-right corner of the small window similar to the one below, for each session configuration, then select **Delete session**.



- From the **Session** pulldown menu at the upper left of the **x2goclient** toolbar, select **Session management** and select a session configuration, then click **Delete session**.

## Step 4: Connect Your Session

In the large **X2Go Client** window, type the name of the session to make a connection. The following events will occur:

- You may be prompted for your passphrase to unlock the key pair, or for your NAS username and password. Provide the answers as prompted.
- A small window will pop up showing the status as **connecting**. The first time you try to connect, you may see a message similar to one of the following two:

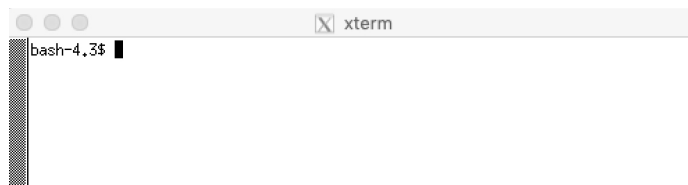
```
The server is unknown. Do you trust the host key?
Public key hash: 127.0.0.1:8222 -
bc:dd:90.....
```

or

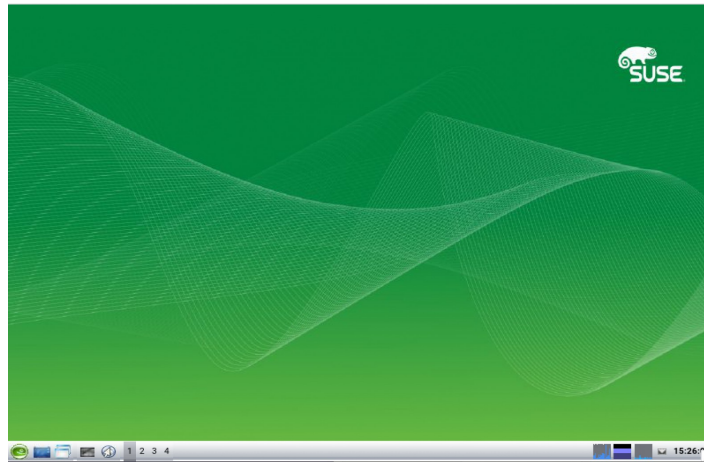
```
The host key for this server was not found but
another type of key exists. An attacker might
have changed the default server key to trick
your client into thinking the key does not
exist yet.
For security reasons, it is recommended to
stop the connection attempt.
Do you want to terminate the connection?
```

If you get such a message, the likely reason is that you have never connected to 127.0.0.1:8222 before. Therefore, it is OK to proceed with the connection and trust/accept the host key.

- If the connection succeeds, records for the session will be created in the `~/.x2go` and `/tmp/.x2go-username` directories of the X2Go remote server (i.e., the PFE used in your SSH tunnel).
  - ♦ If you use **PFE\_XTERM**, a single xterm window similar to the following will pop up:



- ♦ If you use **PFE\_ICEWM**, a large green ICEWM desktop window (with the SUSE logo) will appear. The window is named using its Session ID â for example, **X2Go-username-169-1600128286\_stDICEWM\_dp32**. At the bottom of this window, click on fourth icon from the left to start an xterm window for the PFE. You can have multiple xterm windows on the ICEWM desktop. You can adjust the size and shape of the windows by dragging the corners.



In principle, you can repeat the instructions described in Steps 1 - 4 to establish more than one X2Go connection, as long as the local port numbers for the connections are different. For example, you can have one connection via port 8222 to pfe20 with session name **PFE\_XTERM**, and another one via port 8333 to pfe20 with session name **PFE\_ICEWM**. However, only one session at a time can be actively running. If you are running **PFE\_ICEWM**, for example, and you want to run **PFE\_XTERM**, you must first suspend or terminate **PFE\_ICEWM**. See Step 6: Terminate, Suspend or Resume an X2Go Session for instructions.

**TIP:** If your connection appears to hang (a likely symptom is that the x2go process on your Mac consumes close to 100% CPU and there is audible noise from the fan), quit and restart the X2Go client and try again. If that does not help, you can try removing the `.x2go` directory on your local system and `~/x2go_sessions` file, `~/x2go` directory, and `/tmp/.x2go-username` directory on the PFE where the X2Go server is running.

## Step 5: Run Your Graphics Application

In the xterm window for the PFE, you can run X applications such as `xclock` or `xeyes`. To run the X applications that are available through modules on Pleiades— for example, Tecplot, MATLAB, or Intel Vtune—with their GUIs, load the module before starting the application. For example:

```
pfe% module load tecplot
pfe% tec360
```

**Note:** The version of emacs in the current operating system has a known bug when used with x2go. Use emacs-x11 instead.

## Step 6: Terminate, Suspend or Resume an X2Go Session

If you have an actively running session, you will see a panel similar to the following in the large blue **X2Go Client** window:



In the lower right corner of this panel, look for three small icons. From left to right, they represent: (1) Share Folder; (2) Suspend; and (3) Terminate.

## Terminating the Session

If you do not plan to continue or resume a session, be sure to terminate it.

When you terminate a session, its records in the `~/x2go` directory on the PFE will be removed. A terminated session cannot be resumed.

To terminate a session:

- For **PFE\_XTERM**, click the Terminate icon or simply exit from the xterm.
- For **PFE\_ICEWM**, click the Terminate icon, or click the far-left icon at the bottom of the green ICEWM desktop to log out and shut down.

## Suspending a Session

If your session gets disconnected, or if you suspend a session, you can resume at a later time and pick up where you left off, provided you reconnect to the same PFE as before.

To suspend a session:

- For **PFE\_XTERM**, click the Suspend icon.
- For **PFE\_ICEWM**, click the Suspend icon, or simply close the green ICEWM desktop.

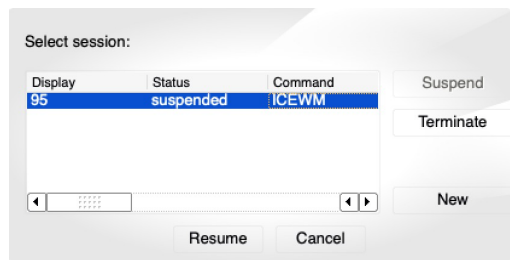
## Resuming a Session

To resume a session:

1. If you have lost the SSH tunnel, re-establish the tunnel with the same local port and the same remote host.
2. From the **X2Go Client** window, select the session configuration to start, for example, **PFE\_ICEWM**. The possible outcomes are:
  - ◆ The session is automatically resumed.



- ◆ The reconnection appears to hang. If this happens, quit and restart the X2Go client. A window similar to the following should appear; click **Resume**.



## References

- [X2Go Documentation](#)

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Article ID: 651

Last updated: 11 Feb, 2021

Revision: 110

Logging In -> Setting Up Your Login for Improved Graphics Performance -> X2Go: An Alternative to X11 and VNC  
<https://www.nas.nasa.gov/hecc/support/kb/entry/651/>